[US 010472]

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Please amend the claims as follows:

Claim 1 (previously amended): A method for classifying facial image data, the method comprising the steps of:

a) training a neural network classifier device for recognizing one or more facial images and

obtaining corresponding learned models of the facial images used for training;

b) inputting a vector including data representing a portion of an unknown facial image to be recognized into said classifier;

c) classifying said portion of said unknown facial image according to a classification method;

d) repeating step b) and c) using a different portion of said unknown facial image at each iteration; and,

e) identifying a single class result from said different portions input to said classifier.

Claim 2 (original): The method of claim 1, herein said classifying step c) includes:

at each iteration, comparing a portion of the unknown image against a corresponding portion of the learned model image for each class; and,

obtaining a confidence score for each classified portion.

Claim 3 (original): The method of claim 2, wherein said identifying step e) includes applying a rule to said confidence scores to obtain said single class result.

Claim 4 (currently amended): ~~The method of claim 3, wherein said confidence score is a probability measure that a current portion of an unknown facial image is identified with a class, said applied rule including obtaining class having majority of class labels determined for each unknown facial image.~~

A method for classifying facial image data, the method comprising the steps of:

a) training a neural network classifier device for recognizing one or more facial images and

obtaining corresponding learned models of the facial images used for training;

b) inputting a vector including data representing a portion of an unknown facial image to be recognized into said classifier;

c) classifying said portion of said unknown facial image according to a classification method at each iteration,

comparing a portion of the unknown image against a corresponding portion of the learned model image for each class, and

obtaining a confidence score for each classified portion;

d) repeating step b) and c) using a different portion of said unknown facial image at each iteration; and,

e) identifying a single class result from said different portions input to said classifier, applying a rule to said confidence scores to obtain said single class result, said confidence score is a probability measure that a current portion of an unknown facial image is identified with a class, said applied rule including obtaining class having majority of class labels determined for each unknown facial image.

Claim 5 (original): The method of claim 2, wherein said classifying step c) includes decreasing at each iteration, the portion of the unknown image being tested and, comparing the decreased portion of the unknown image against a corresponding decreased portion of the learned model image for each class.

Claim 6 (original): The method of claim 5, wherein said portions are decreased from 100% of the unknown facial image to 50% of the unknown facial image at equal decrements.

Claim 7 (original): The method of claim 1, wherein a Radial Basis Function Network is implemented for training and classifying each image portion.

Claim 8 (currently amended): ~~The method of claim 7, wherein~~ A method for classifying facial image data, the method comprising the steps of:

a) training a neural network classifier device for recognizing one or more facial images and

obtaining corresponding learned models of the facial images used for training, wherein a Radial Basis Function Network is implemented for training and classifying each image portion, said training step comprises:

i) initiating the Radial Basis Function Network, the initializing step comprising the steps of:

fixing the network structure by selecting a number of basis functions F, where each basis function I has the output of a Gaussian non-linearity,

determining the basis function means μ_I where I = 1, ..., F, using a K-means clustering algorithm,

determining the basis function variances σ_I^2 , and

determining a global proportionality factor H, for the basis function variances by empirical search;

ii) presenting the training, the presenting step comprising the steps of:

inputting training patterns X(p) and their class labels C(p) to the classification method, where the pattern index is p = 1, ... , N,

computing the output of the basis function nodes $y_I(p)$, F, resulting from pattern X(p),

computing the F x F correlation matrix **R** of the basis function outputs; and

computing the F x M output matrix **B**, where d_j is the desired output and M is the number of output classes and j = 1, ... , M, and

iii) determining weights, the determining step comprising the steps of:

inverting the F x F correlation matrix **R** to get $\mathbf{R}^{-1}$; and

solving for the weights in the network;

b) inputting a vector including data representing a portion of an unknown facial image to be recognized into said classifier;

c) classifying said portion of said unknown facial image according to a classification method;

d) repeating step b) and c) using a different portion of said unknown facial image at each iteration; and,

e) identifying a single class result from said different portions input to said classifier.

Claim 9 (currently amended): ~~The method of claim 8, wherein the classifying step further comprises:~~

~~presenting each X_{test} portion at each iteration to the classification method; and~~

~~classifying each X_{test} by:~~

~~computing the basis function outputs, for all F basis functions;~~

~~computing output node activations (20); and~~

~~selecting the output z_j with the largest value and classifying the X_{test} portion as a class j.~~

A method for classifying facial image data, the method comprising the steps of:

a) training a neural network classifier device for recognizing one or more facial images and

obtaining corresponding learned models of the facial images used for training, wherein a Radial Basis Function Network is implemented for training and classifying each image portion, wherein said training step comprises:

i) initiating the Radial Basis Function Network, the initializing step comprising the steps of:

fixing the network structure by selecting a number of basis functions F, where each basis function I has the output of a Gaussian non-linearity;

determining the basis function means μ_I where I = 1, ..., F, using a K-means clustering algorithm;

determining the basis function variances σ_I^2 ; and

determining a global proportionality factor H, for the basis function variances by empirical search;

ii) presenting the training, the presenting step comprising the steps of:

inputting training patterns X(p) and their class labels C(p) to the classification method, where the pattern index is p = 1, ... , N,

computing the output of the basis function nodes y_I (p), F, resulting from pattern X(p),

computing the F x F correlation matrix **R** of the basis function outputs,

and

computing the F x M output matrix **B**, where d_j is the desired output and M is the number of output classes and j = 1, ... , M and

iii) determining weights, the determining step comprising the steps of:

inverting the F x F correlation matrix **R** to get $\mathbf{R}^{-1}$; and

solving for the weights in the network;

b) inputting a vector including data representing a portion of an unknown facial image to be recognized into said classifier;

c) classifying said portion of said unknown facial image according to a classification method, the classifying step further comprising:

presenting each $\mathbf{X}_{test}$ portion at each iteration to the classification method and

classifying each $\mathbf{X}_{test}$ by computing the basis function outputs, for all F basis functions, computing output node activations, and selecting the output $\mathbf{z}_j$ with the largest value and classifying the $\mathbf{X}_{test}$ portion as a class j;

d) repeating step b) and c) using a different portion of said unknown facial image at each iteration; and,

e) identifying a single class result from said different portions input to said classifier.

Claim 10 (original): The method of Claim 1, wherein the classifying step c) comprises outputting a class label identifying a class to which the detected unknown facial image portion corresponds to and a probability value indicating the probability with which the unknown facial image pattern belongs to the class.

Claim 11 (previously presented): An apparatus for classifying facial image data comprising:

a neural network classifier device trained for recognizing one or ore facial images and generating corresponding learned models associated with the facial images used for training;

means for iteratively inputting a vector each including data representing a portion of an unknown facial image to be recognized into said classifier, a different image portion being input to said classifier at each iteration, said classifier device classifying each said portion of said unknown facial image according to a classification method;

means for identifying a single class result from said different portions input to said classifier.

Claim 12 (previously presented): The apparatus of claim 11, wherein said classifier includes:

a mechanism for comparing a portion of the unknown image against a corresponding portion of the learned model image for each class, at each iteration; and, obtaining a confidence score for each classified portion.

Claim 13 (previously presented): The apparatus of claim 12, wherein said means for identifying applies a rule to said confidence scores to obtain said single class result.

Claim 14 (currently amended): ~~The apparatus of claim 13, wherein said confidence score is a probability measure that a current portion of an unknown facial image is identified with a class,~~

~~said applied rule including identifying class having majority of class labels determined for each unknown facial image.~~

An apparatus for classifying facial image data comprising:

a neural network classifier device trained for recognizing one or ore facial images and generating corresponding learned models associated with the facial images used for training;

means for iteratively inputting a vector each including data representing a portion of an unknown facial image to be recognized into said classifier, a different image portion being input to said classifier at each iteration, said classifier device classifying each said portion of said unknown facial image according to a classification method,

said classifier includes a mechanism for comparing a portion of the unknown image against a corresponding portion of the learned model image for each class, at each iteration and obtaining a confidence score for each classified portion,

said confidence score is a probability measure that a current portion of an unknown facial image is identified with a class, said applied rule including identifying class having majority of class labels determined for each unknown facial image; and

means for identifying a single class result from said different portions input to said classifier, said means for identifying applies a rule to said confidence scores to obtain said single class result.

Claim 15 (original): The apparatus of claim 12, including mechanism for decreasing each portions of each unknown facial image being tested at each iteration and, comparing the decreased portion of the unknown image against a corresponding decreased portion of the learned model image for each class.

Claim 16 (original): The apparatus of claim 15, wherein said portions are decreased from 100% of the unknown facial image to 50% of the unknown facial image at equal decrements.

Claim 17 (original): The apparatus of claim 11, wherein a Radial Basis Function Network is implemented for training and classifying each image portion.

Claim 18 (currently amended): A ~~program storage device readable by machine~~ computer-readable medium, ~~tangibly~~ embodying a program of a instructions ~~executable by the machine~~ to perform method steps for classifying facial image data, the method comprising the steps of:

(a) training a neural network classifier device for recognizing one or more facial images and obtaining corresponding learned models the facial images used for training;

(b) inputting a vector including data representing a portion of an unknown facial image to be recognized into said classifier;

(c) classifying said portion of said unknown facial image according to a classification method;

(d) repeating step b) and c) using a different portion of said unknown facial image at each iteration;

and,

(e) identifying a single class result from said different portions input to said classifier.

Claim 19 (currently amended): The ~~program storage device readable by machine~~ computer-readable medium as claimed in claim 18, wherein said classifying step c) includes:

at each iteration, comparing a portion of the unknown image against a corresponding portion of the learned model image for each class; and, obtaining a confidence score for each classified portion.

Claim 20 (currently amended): The ~~program storage device readable by machine~~ computer-readable medium as claimed in claim 19, wherein said identifying step e) includes applying a rule to said confidence scores to obtain said single class result.

Claim 21 (currently amended): A method for classifying facial image data, the method comprising:

training a classifier device for recognizing one or more facial images and

obtaining corresponding learned models the facial images used for training;

inputting a vector including data representing a portion of an unknown facial image to be recognized into said classifier;

classifying said portion of said unknown facial image according to a classification method;

repeating the inputting and classifying using a different portion of said unknown facial image at each iteration; and,

identifying a single class result from said different portions input to said classifier;

and wherein:

the classifying includes: at each iteration, comparing a portion of the unknown image against a corresponding portion of the learned model image for each class; and obtaining a confidence score for each classified portion, the confidence score being a probability measure that a current portion of an unknown facial image is identified with a class, ~~the~~ an applied rule including obtaining class having majority of class labels determined for each unknown facial image; and

the identifying includes applying a the rule to said confidence scores to obtain said single class result.

Claim 22 (previously presented): A method for classifying facial image data, the method comprising:

training a classifier device for recognizing one or more facial images and obtaining corresponding learned models the facial images used for training;

inputting a vector including data representing a portion of an unknown facial image to be recognized into the classifier;

classifying the portion of the unknown facial image according to a classification method;

repeating the inputting and classifying using a different portion of the unknown facial image at each iteration; and,

identifying a single class result from the different portions input to the classifier;

and wherein:

a Radial Basis Function Network is implemented for training and classifying each image portion; and

the training includes:

initiating the Radial Basis Function Network, the initializing including: fixing the network structure by selecting a number of basis functions F, where each basis function I has the output of a Gaussian non-linearity; determining the basis function means μ_I where I = 1, ..., F, using a K-means clustering algorithm; determining the basis function variances σ_I^2 ; and determining a global proportionality factor H, for the basis function variances by empirical search;

presenting the training, the presenting including: inputting training patterns X(p) and their class labels C(p) to the classification method, where the pattern index is p = 1, ... , N; computing the output of the basis function nodes $y_1(p)$, F, resulting from pattern X(p); computing the F x F correlation matrix **R** of the basis function outputs; and computing the F x M output matrix **B**, where d_j is the desired output and M is the number of output classes and j = 1, ... , M; and

determining weights, the determining including: inverting the F x F correlation matrix **R** to get $\mathbf{R}^{-1}$; and solving for the weights in the network.

Claim 23 (previously presented): The method of claim 22, wherein the classifying includes:

presenting each Xtest portion at each iteration to the classification method; and

classifying each Xtest by:

computing the basis function outputs, for all F basis functions;

computing output node activations; and

selecting the output zj with the largest value and classifying the Xtest portion as a class j.

Claim 24 (previously presented): Apparatus for classifying facial image data comprising:

a classifier device trained for recognizing one or ore facial images and generating corresponding learned models associated with the facial images used for training;

means for iteratively inputting a vector each including data representing a portion of an unknown facial image to be recognized into the classifier, a different image portion being input to the classifier at each iteration, the classifier device classifying each the portion of the unknown facial image according to a classification method;

means for identifying a single class result from the different portions input to the classifier.

and wherein:

the classifier includes: a mechanism for comparing a portion of the unknown image against a corresponding portion of the learned model image for each class, at each iteration; and, obtaining a confidence score for each classified portion;

the means for identifying applies a rule to the confidence scores to obtain the single class result; and

the confidence score is a probability measure that a current portion of an unknown facial image is identified with a class, the applied rule including identifying class having majority of class labels determined for each unknown facial image.